Digital Camera System for Microscopy

DIGITAL SIGHT

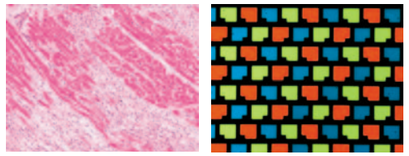
The Choice is Yours

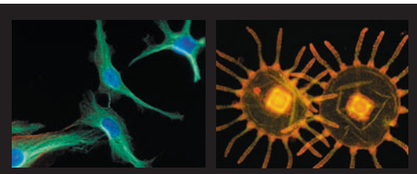
– A perfect digital solution for your requirements

Nikon has developed a comprehensive range of digital camera systems that are optimized for capturing microscopic images of superb quality.
The 5 types of camera heads and 2 types of control units all function seamlessly together, providing the ultimate in flexibility to configure the perfect digital system for many applications.
The Digital Sight series provides the solution for a variety of applications, from industrial to biological use, and from high-level research to simple capture of inspection results.

Recommended camera heads for general observation

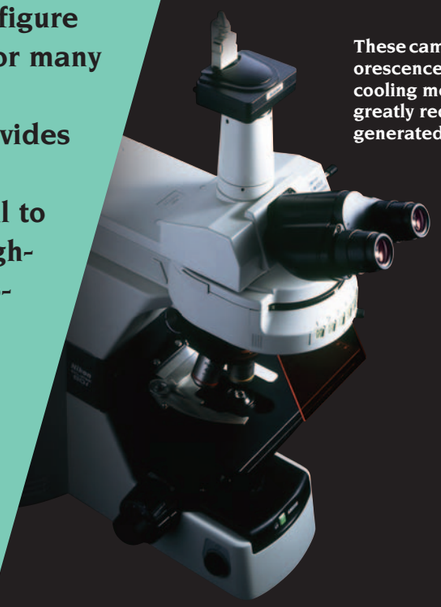
These camera heads can be deployed in a broad range of illumination techniques, including bright-field, darkfield, phase contrast and Nomarski DIC (differential interference contrast).





Recommended camera heads for fluorescence and ultra low light observations

These cameras are ideal for darkfield and fluorescence samples. Incorporating a Peltier cooling mechanism, cooled types are able to greatly reduce the thermal noise that can be generated from long time exposures.



DS-2Mv

Smooth and comfortable live images

Incorporates a 2-megapixel colorCCD that can smoothly display SXGA live motion images at 15 fps*1 (max. 30 fps). A well balanced camera head that enables display of live images and capture of high definition images.
*1 Using the DS-L1, with output to an external monitor.

High speed

DS-5M

Captures true to life images

DS-5M incorporates a 5-megapixel color CCD that offers a high-resolution image size of 2560x1920 pixels. It is ideal for acquiring detailed microscopic images under a variety of illumination techniques, including bright-field, phase contrast and (DIC).

High resolution

DS-2MBWc

DS-2MBW

DS-2MBWc
DS-2MBW

High-sensitivity imaging

The 2MBWc incorporates a Peltier cooling mechanism that minimizes thermal noise. Its 2-megapizel monochrome CCD boasts a sensitivity rating five times greater than that of previous models, resulting in a shortened total exposure time and reduced fading, and allowing the realization of high frame rate.
* A non-cooled model (DS-2MBW) is also available.

DS-5Mc

For extremely clear color fluorescence images

With its built-in Peltier cooling mechanism, the temperature of the 5.0-megapixel color CCD can be maintained at 20 °C below room temperature . Thermal noise is thus greatly reduced during long time exposure.

Stand-alone camera control unit

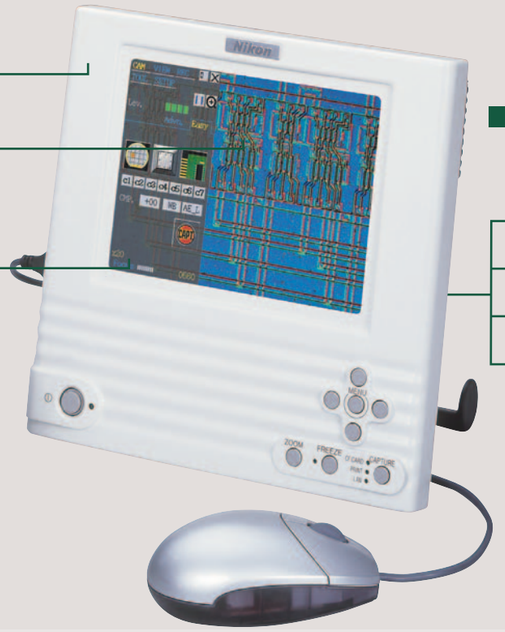
DS-L1

A stand-alone control unit incorporating a large, high-definition monitor, offering easy operation and useful functionality.

Stand-alone type
Does not require a PC or an external monitor.

6.3type LCD monitor
XGA (1024x768) screen resolution, which allows simple, fast and accurate focusing without the need to enlarge the image.

On-screen menus
Intuitive, on-screen menu-based operation allows for simple set-up and capture.



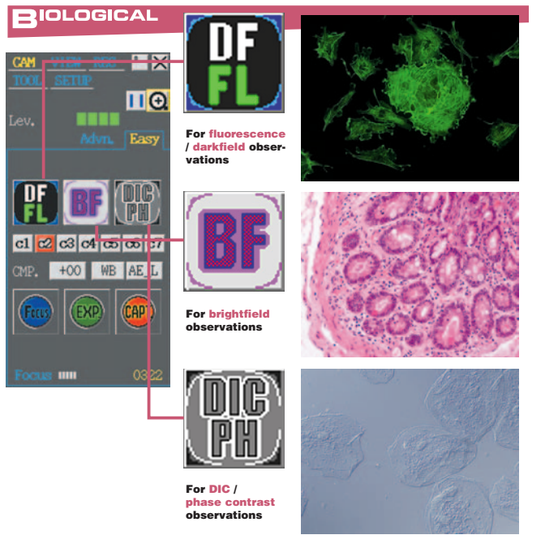
Excellent output options

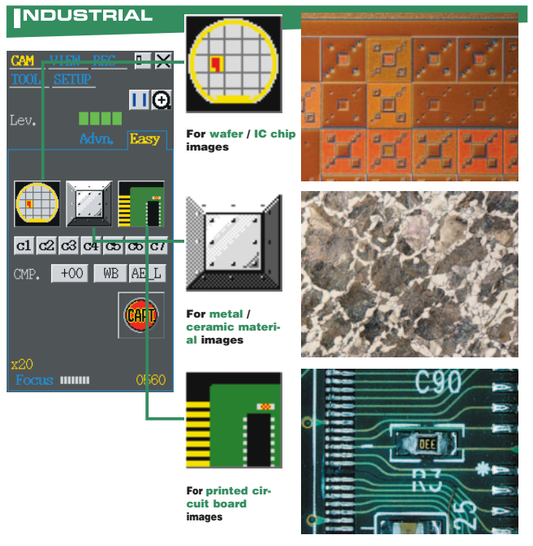
In addition to saving to a Compact Flash™ card, the unit offers these output options:

- Analog RGB output
- Direct printing (using PictBridge)
- USB Mass Storage Class
- Network connectivity

Scene mode for one-click optimal photography

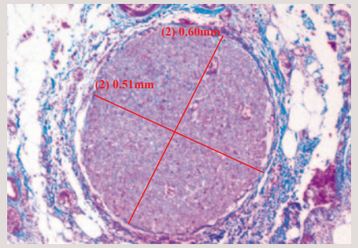
Using Nikon's experience with digital imaging, optimal pre-programmed imaging modes have been made available as menus, including preset camera conditions according to the sample types and illumination techniques used. Optimal images can be captured with a simple click. Users can also customize settings and save up to seven of these modes for quick retrieval.



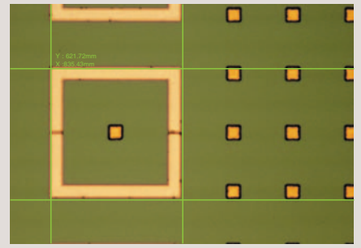


A wide variety of tool functions

Measurement tools

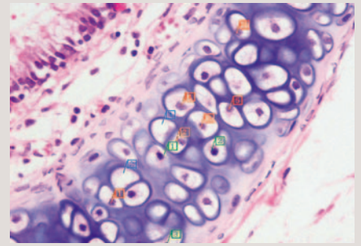


Distance measurement
Easily measures the distance between any two points specified by the user.



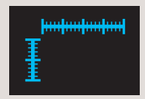
Vertical / horizontal measurement
Easily measures the distance between two horizontal and two vertical lines.

Screen patterns
Cross line and concentric circle patterns can be displayed.



Count marking
Up to 99 serial numbers per color can be marked to provide a convenient way to identify points of interest on-screen. They can be easily saved and printed with the image.

Scale display



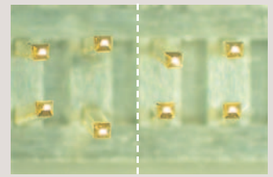
XY scale display

Point to line distance

Circular measurement
(displays diameter, circumference, center of gravity)

Angle
(intersection)

Other useful tools



Two-screen split display
A frozen image can be displayed alongside the live image for easy comparison.

- Text input; line and figure drawing
- Thumbnail image display
- Superimpose function
- Shading function
- Focus indicator
- Histogram
- Digital zoom
- Log text saving
- Interval exposure

Expanded functionality provided by external connectivity

Network functionality

A 10/100Base-TX compatible Ethernet port is provided. By using an FTP client and HTTP/FTP/Telnet server functionality, it is possible to transmit images to a network or remotely control the camera from a network.

Direct Print function (option)

* A separate license is needed in order to use the Direct Print function.

●Real 10 mode
The Real 10 mode is selectable with a dedicated Mitsubishi CP900DW. With this mode it is possible to print with a device magnification of 10x for easy confirmation of sample size.

* DS-5M/DS-5Mc C-mount 0.7X TV Adaptor (optional) is necessary
DS-2Mv/DS-2MBW/DS-2MBWc C-mount 0.55X TV Adaptor (optional) is necessary

●PictBridge
It is possible to print directly without a computer using a PictBridge compatible printer and USB connection.

Interactive control of microscope and camera (option)

* A separate license is needed in order to use the interactive control.

In combination with the ECLIPSE 90i motorized microscope, it is possible to control the 90i from the DS-L1 menu and to automatically detect and record the microscope status data with the image, including the objective magnification and fluorescence filter in use. Automatic detection of status is also possible when combined with the ECLIPSE 80i microscope configured with a digital imaging head.

Example of the microscope control menu

PC based camera control unit Imaging Software

DS-U1/ACT-2U

Single cable connection to a PC via USB2.0 interface. Extremely versatile imaging software that is easy to operate, and has a wealth of functions to suit almost any needs.

This compact control unit can be connected quickly to a Windows® based PC via its USB2.0 interface, without the need for a separate PCI board.

By controlling the camera with a PC, the user can expand their system, not only to facilitate image capture but also results analysis, and image processing with Nikon's ACT-2U Multi-functional imaging software.

High-speed image transfer to PC

Two USB ports are provided.
Connects to a PC via USB2.0 interface (USB2.0 offers both wide compatibility and high data transfer speeds), which enables camera control and live image display at high speed on a monitor.

A variety of screen layouts

The configuration offers a standard screen layout and advanced layouts with a high degree of image analysis functionality. Each layout can be customized according to need.

Standard Layout, for straightforward operations

1 Tool bar
Frequently used menu items are displayed as buttons

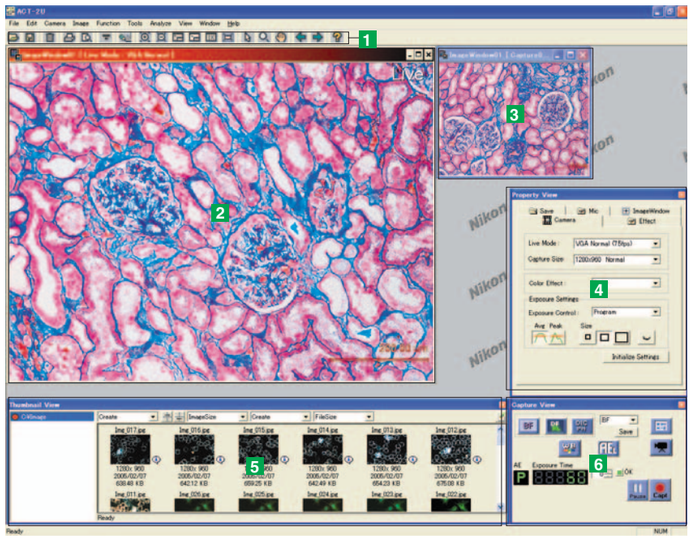
2 Live image screen

3 Captured image screen
Display of the captured image

4 Properties dialog box
For display/alteration of the camera's current settings

5 Image thumbnails

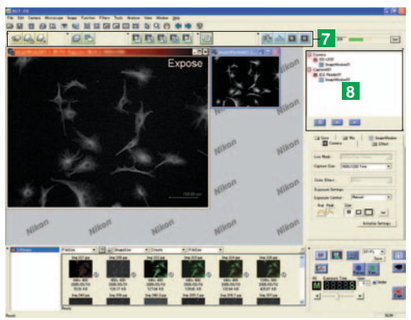
6 Capture window
Basic image capture control window
Scene function for one-click optimal photography



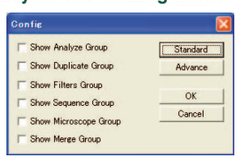
Advanced Layout, adding useful functions

7 Toolbox
Tool buttons for processing and analysis of images

8 Process view window
Analysis of focus, profile and histogram
Displays analytical settings for control and focus

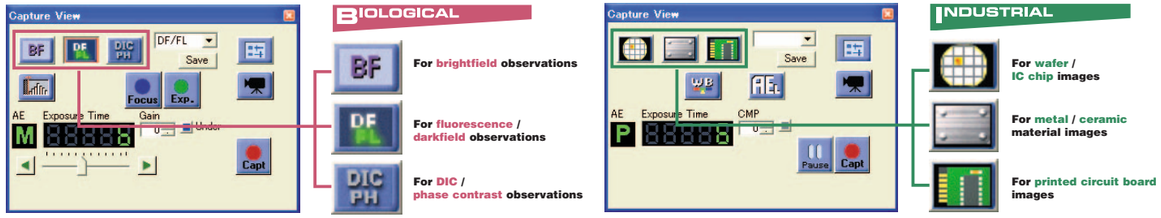


Layout customizing window

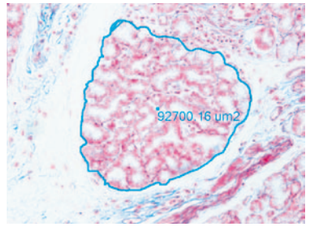


Settings box, which allows detailed customizing of the screen layout, in addition to the standard and advanced layout.

Scene mode for one-click optimal photography



A variety of measurement tools



Area
The area inside an enclosure, outlined by the mouse, is automatically calculated

Screen patterns
Grid or concentric circle patterns can be displayed.

Scale display

Distance measurement

point to line distance

XY scale display

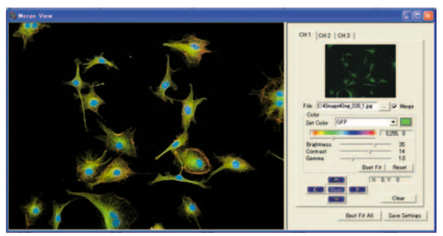
Circular measurement
(displays diameter, circumference, center of gravity)

Angle
(intersection)

Key functions

Superimposition using the Merge function

It is easy to produce merged images of multistained fluorescence samples using monochrome photography. When you acquire images after initially setting the number of layers and display colors for each reagent, colored images will be automatically displayed. By changing the wavelength for each acquisition, this function easily allows a superimposed image to be produced.



Interactive control of the microscope and camera

In combination with the ECLIPSE 90i motorized microscope, it is possible to control the 90i from the ACT-2U menu and to automatically detect and record the microscope status data with the image, including the objective magnification and fluorescence filter in use. Automatic detection of status is also possible when combined with the ECLIPSE 80i microscope configured with a digital imaging head.

The control software of the 90i and digital imaging head can be easily accessed from ACT-2U.

Tool Bar:
1. Main Tool Bar
2. Tool Box
3. Annotation Tool Box
4. Graphic Annotation Setup

Recording Mode:
1. Average Recording
2. Time Lapse Recording
3. Variable Time Lapse Recording
4. Z Stack Recording

Image Processing:
1. Direction/Resize Control
2. Crop Control
3. Duplicate Control
4. Kirsch Filter
5. Sobel Filter
6. Laplace Filter
7. Low Pass Filter
8. Median Filter

Image Display:
1. 2D Image View
2. 2D Quadrant View
3. 3D Orthogonal View
4. 3D Tiling View

Image Analysis:
1. Focus Analysis
2. Profile Analysis
3. Histogram Analysis
4. Area ROI Analysis
5. Line ROI Analysis

Process View
Thumbnail Window
Experimental Information Window

Printing:
1. Print Main Menu
2. Print Preview Mode
3. Layout Edit Mode

File Operation

Camera Control:
1. Hardware Connection Dialog Box
2. Control Window
3. Property Window

Microscope Control:
1. Hardware Connection Dialog Box
2. Microscope Control
3. Pixel Divide Function Setup
4. Fixed Scale Bar Setup

System Lineup

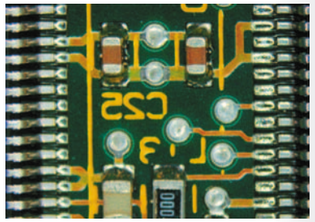
For industrial applications

Live image observation

DS-2Mv-L1 +SMZ1000

Stand-alone type that offers high frame rate for real-time observation

- Maximum frame rate of 30 fps enables the system to be optimized for live observation.
- Stand-alone type featuring an XGA 6.3 type TFT monitor. Observation on a larger screen is possible with an analog RGB output function
- Images can be saved to the CF card simply by clicking the capture button.

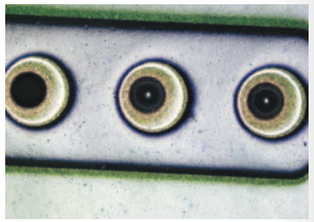


Measurement

DS-2Mv-L1 +MM-40

Stand-alone type, with convenient built-in measuring functions

- Maximum frame rate of 30 fps enables the system to be optimized for live observation.
- Simple measurement functions are built into the camera control unit (DS-L1), including distance, angle of intersection, circular measurements, area, etc. Measurement results can be saved together with the image.
- Images can be saved to the CF card simply by clicking the capture button.



DS-2Mv-U1 +Module Microscope

PC-based system that utilizes multi-functional imaging software

- This system is controlled by a PC via a USB2.0 connection.
- ACT-2U imaging software enables the display of smooth and easy-to-see live images as well as image acquisition, processing, analysis and simple measurements via a PC.

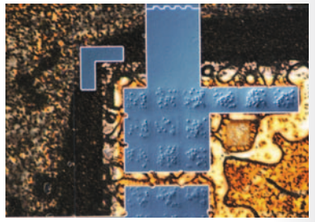
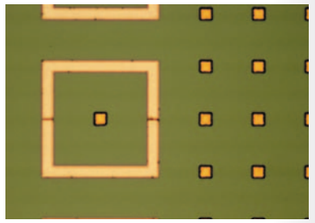


Image acquisition

DS-5M-L1 +Module Microscope

High definition stand-alone type with network functions

- Incorporates a high-resolution 5-megapixel CCD, with a capture size of 2560x1920 pixels, minute details of images can be captured beautifully.
- The camera control unit is equipped with a built-in large 6.3 type XGA TFT LCD monitor for live image viewing.
- Ethernet-based network functionality is built in. Images can be saved on any given server as well as on the CF card.

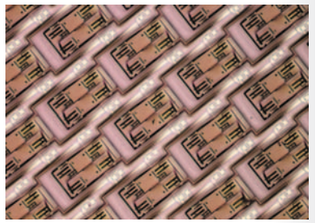


Analysis

DS-5M-U1 +Module Microscope

High definition PC-based system equipped with multi-functional imaging software.

- Incorporates a high-resolution 5-megapixel CCD, with a capture size of 2560x1920 pixels, true-to-life images can be captured with ease.
- Controlled from a PC via a USB2.0 connection.
- ACT-2U imaging software enables smooth and easy display of images.
- A launcher function is available. This allows saved images to be easily transferred to other data application software for processing.



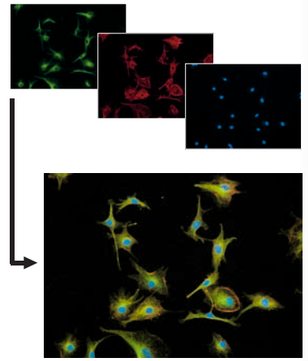
*Exapmle of image created using image composition software

For biological applications

DS-2MBWc-U1 +ECLIPSE TE2000

Offers image display and capture for low light florescence.

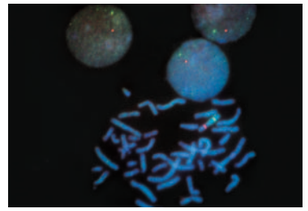
Combining a high sensitivity camera equipped with a cooling mechanism that eliminates thermal noise, with software that boasts a wealth of analytical functions.
This system is most appropriate for high-level research that demands the capture of weak fluorescence images clearly, with a high signal-to-noise ratio.



DS-5Mc-U1 +ECLIPSE 90i

Offering the potential for integrated control of the camera and microscope

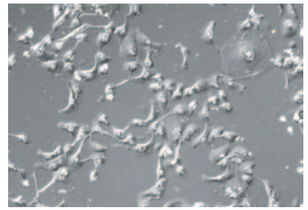
A single cable connection via USB interface is possible from the control unit to a PC and the Eclipse 90i microscope. Since the 90i can be controlled from the ACT-2U imaging software, the operation of the microscope can be linked with image recording. Auto-focus image capture during bright-field microscopy is possible, utilizing the image contrast data detected by the camera.



DS-2Mv-L1 +ECLIPSE 80i

Delivering both smooth, live motion images and beautiful captured images

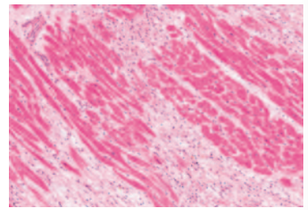
Thanks to the high-frame-rate, 2-megapixel CCD camera, the movement of live images is extremely smooth. Live images can be viewed on the large LCD monitor built into the control unit.



DS-5M-L1 +ECLIPSE 50i

For easy image capture without a PC

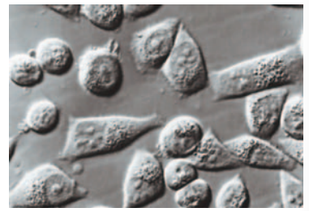
This stand-alone control unit, which does not require connection to a PC, is a real space saver. Camera conditions most appropriate to the illumination techniques used can be chosen from a menu, allowing anybody to easily capture beautiful images.



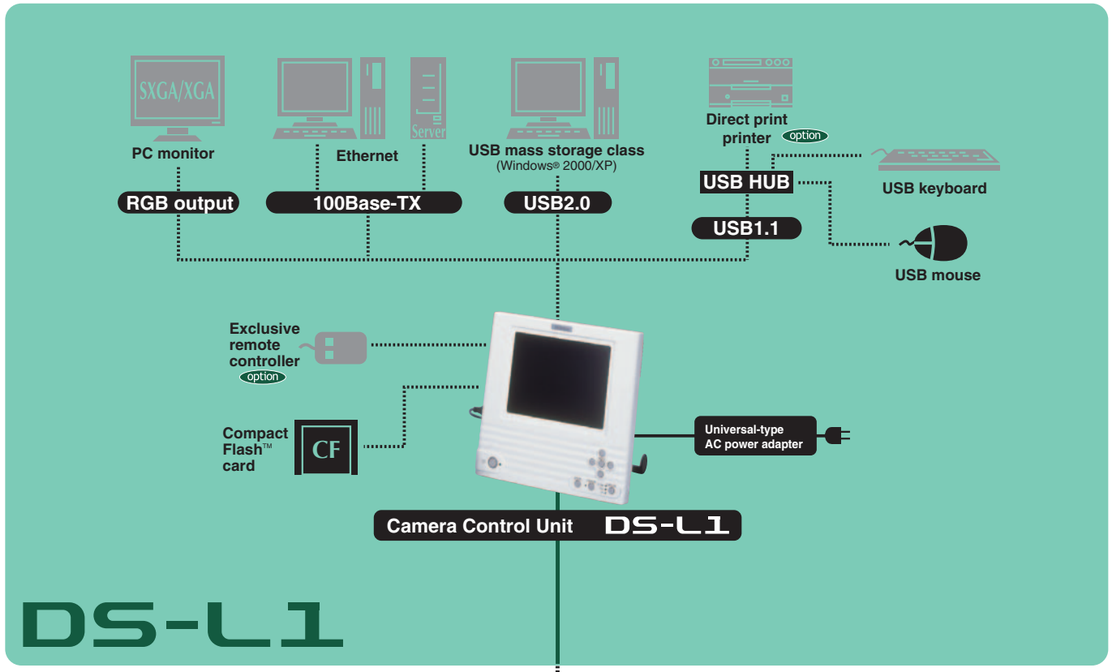
DS-2MBW-L1 +ECLIPSE TS-100F

A reasonably priced monochrome configuration

Easily takes high contrast monochrome images in observations such as phase contrast and DIC. Using a high frame rate camera, live motion can be quickly and easily confirmed.

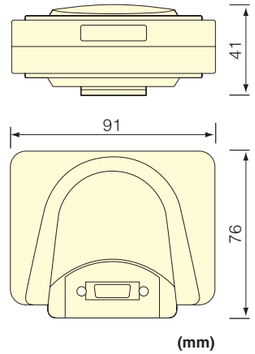


System Diagram

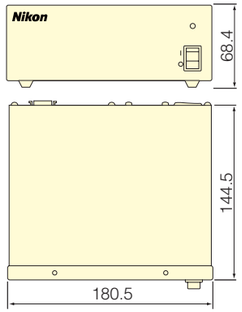


Specifications

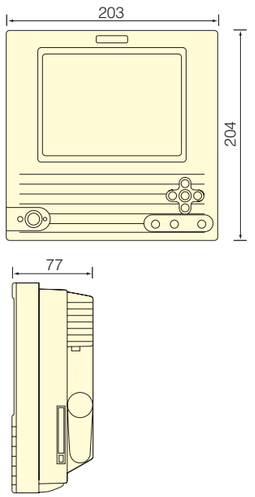
DS-2MBWc/DS-2MBW
DS-2Mv
DS-5Mc/DS-5M



DS-U1



DS-L1



Camera Heads DS-2MBWc / DS-2MBW / DS-2Mv

	DS-2MBWc	DS-2MBW	DS-2Mv
CCD	1/1.8 in. high-density CCD: Total number of pixels: 2.11 million (effective 1.98 million)		
Recordable pixels	1600 x 1200 pixels, 800 x 600 pixels, 400 x 300 pixels		
CCD cooling device	Peltier Device: Ambient temperature -20°C	—	
Sensitivity	Equivalent to ISO350 (Can be varied between ISO 160-6400 equivalent)		Equivalent to ISO100 (Can be varied between ISO 50-2000 equivalent)
A/D conversion	12-bit		
Live display mode (DS-L1)	1600 x 1200 (15fps), 800 x 560 (30fps), Center Scan (30fps) * Display reduced or enlarged to SXGA/XGA with DS-L1		
Live display mode (DS-U1)	1600 x 1200 (4fps), 800 x 600 (15fps), 400 x 300 (20fps), Center Scan 400 x 280 * Frame rates are a guide only. Indicated rates assume USB data transfer speeds.		800 x 600(12fps), 400 x 300(20fps), Center Scan 400 x 280(30fps) * Frame rates are a guide only. Indicated rates assume USB data transfer speeds.
Lens mount	C-mount		
Exposure time	1/1000 to 600 sec	1/1000 to 60 sec	
Dimensions	91.0 (W) x 76.0 (D) x 41.0 (H) mm		
Weight	approx. 290g	approx. 260g	
System composition	Camera Cable (3m)		
Optional accessories	For wide field of view observations 0.55x Relay lens (C-mount)		

Camera Heads DS-5Mc / DS-5M

	DS-5Mc (Cooled CCD Camera)	DS-5M (Standard CCD Camera)
CCD	2/3 in. high-density CCD: Total number of pixels: 5.24 million (effective 5.07 million)	
Recordable pixels	2560 x 1920 pixels, 1280 x 960 pixels, 640 x 480 pixels	
CCD cooling device	Peltier Device: Ambient temperature -20°C	—
Sensitivity	Equivalent to ISO64 (Can be varied between ISO 32-1250 equivalent)	
A/D conversion	12-bit	
Live display mode (DS-L1)	2560 x 1920 (3.8fps), 1280 x 960 (7.5fps), Center Scan (15fps) * Display reduced to SXGA/XGA with DS-L1	
Live display mode (DS-U1)	1280 x 960 (2fps), 640 x 480 (7.5fps), Center Scan 640 x 480 (15fps) * Frame rates are a guide only. Indicated rates assume USB data transfer speeds.	
Lens mount	C-mount	
Exposure time	1/1000 to 600 sec	1/1000 to 60 sec
Dimensions	91.0 (W) x 76.0 (D) x 41.0 (H) mm	
Weight	approx. 290g	approx. 260g
System composition	Camera Cable (3m)	
Optional accessories	For wide field of view observations 0.7x Relay lens (C-mount)	

Camera Control Units DS-U1 / DS-L1

	DS-U1	DS-L1
Exposure control	Program AE, Shutter-priority AE, Focus AE, Manual with AE lock function	
Exposure correction	13 steps	Correction range: ±2.0, Step: 1/3
Digital zoom	5 to 2400%	Up to 16x (8 steps)
Interval shooting	5 sec. - 12 hr. intervals	10 sec. - 6 hr. intervals
Exposure metering	Average metering, Peak hold metering	
Exposure metering range	3 selectable sizes	
White balance	Set method, Color balance adjustable	
Image adjustments	Gamma correction, shading adjustment, black level adjustment, hue wheel variation, color saturation adjustment	
Storage format	BMP, TIFF, JPEG, JPEG2000,AVI	BMP, JPEG (4-step compression)
Interface	USB device port (computer control connector), USB host port (microscope connector)	USB device port (Mass Storage Class support), USB host port (USB mouse, USB keyboard connection)
Power supply	AC100-240V 50/60Hz	
Power consumption	43VA	138VA
Dimensions	180.5 (W) x 144.5 (D) x 68.4 (H) mm	203 (W) x 77(D) x 204 (H) mm
Weight	approx. 1000g	Control unit: approx. 1300g, AC adapter: approx. 350g
Operating environment	0-40°C, 85% RH max. (without condensation)	
System composition	Power cord	AC adapter, Power cord, CompactFlash™ card (128MB), Mouse
Networking	—	Ethernet (10/100Base-TX), DHCP compatible, HTTP, TELNET or FTP server, FTP client
LCD monitor	—	6.3-in. TFT color LCD XGA (1024 x 768, 60Hz)
External monitor output	—	Analog RGB: SXGA (1280x1024, 60Hz), XGA (1024x768, 60Hz)
Storage media	—	CompactFlash™ card (Type I, Type II)
Direct printing	—	Direct printing possible without a computer using special printer (PictBridge compatible)
Optional accessories	—	Exclusive remote controller, Direct Print license key, Direct printer CP900DW (Mitsubishi),

●ACT-2U Imaging Software System Requirements

Computer type	MS-DOS PC supporting USB2.0
CPU	Pentium® 4, 1.7GHz or faster (Pentium® 4, 2.4GHz or faster recommended)
RAM	1GB or more
USB2.0	2 ports
Hard disk	100MB to install, 300MB or more free space to run (on launch disk)
Operating system	Windows® 2000 Professional (SP4 or later, English or Japanese), Windows® XP Professional (English or Japanese), pre-installed versions only
Graphics	1280x1024 pixels or more, 16-bit color or more (24-bit color recommended), DirectX 9.0b support
Others	CD-ROM drive (to install), Microsoft® USB2.0 driver

The above system requirements list does not constitute a guarantee that all computers and systems meeting these criteria will be able to run the software.

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WARNING	TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING THE EQUIPMENT.

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